IONIC LIQUID PROCESS FOR THE RECOVERY OF NEODYMIUM AND DYSPROSIUM FROM USED NdFeB MAGNETS

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Recycling of rare earths is not only important from the environmental point of view but also to ensure sufficient supplies of these elements.[1] An ionic-liquid-based procedure for the efficient extraction and separation of rare earths and cobalt from end-of-life NdFeB permanent magnets is presented.[2] In a first step, an iron-free leachate is prepared using nitric acid. Cobalt is separated through a liquid–liquid extraction in aqueous nitrate media using as organic phase the ionic liquid trihexyl(tetradecyl)phosphonium nitrate which is easily prepared from the commercially available ionic liquid trihexyl(tetradecyl)phosphonium chloride (Cyphos® IL 101). Afterwards neodymium and dysprosium are successfully separated using ethylenediaminetetraacetic acid (EDTA) as a selective complexing agent during liquid–liquid extraction with the same ionic liquid. Different parameters of the separation process such as shaking speed, time, temperature, pH effect and concentration of complexing agents were optimized. The designed process allowed separating these three elements efficiently in few steps. The separated rare earths and cobalt were precipitated with oxalic acid and then calcined. Nd_2O_3, Dy_2O_3 and CoO were obtained with purities of 99.6%, 99.8% and 99.8%, respectively. It was demonstrated that the previously employed ionic liquid can be easily recycled and efficiently reused again for further separations.

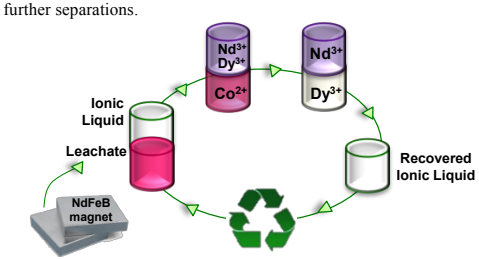

Figure 1. General scheme of the recycling procedure.

References

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2. S. Riano and K. Binnemans, *Green Chem.*, 2015, **17**, 2931-2942.

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